**A.P. Calculus Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Intro Problems #3 Due Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Do these quickly

The following problems are intended to refresh your skills. You should be able to do all ten problems in less than 5 minutes.

Q1. The value of *y* changes by 3 units when *x* changes by 0.1 unit. About how fast is *y* changing?

Q2. The value of *y* changes by -5 units when *x* changes by 0.01 unit.   
What doe the derivative equal?

Q3. Sketch the graph of the absolute value function .

Q4. What is 50 divided by ½?

Q5. Find *f*(3) if .

Q6. Evaluate:

Q7. How many days are there is a leap year?

Q8. The instantaneous rate of change of a function is called the \_\_\_\_\_\_\_\_\_ of the function.

Q9. The product of *x* and *y* for a function is called the \_\_\_\_\_\_\_\_\_\_\_\_\_ of the function.

Q10. At what value(s) of *x* is equal to zero?

1. *Spaceship Problem:* A spaceship is being launched from Cape Canaveral. As the last stage of the rocket motor is firing, the velocity is given by where *v(t)* is in feet per second and *t* is the number of seconds since the last stage started.

1. Plot the graph of *v(t)* versus *t*, from *t* = 0 to *t* = 30. Sketch the result.
2. Tell why the area of the region under the graph represents the distance the spaceship went in this 30-secind interval. Use units!!
3. Find, Approximately, the distance traveled between *t* = 0 and *t* = 30 by using trapezoids of width corresponding to 5 sec. Sketch these trapezoids on your graph.
4. What mathematical term is used for the product of velocity and time found in this way?
5. To go into orbit around the earth, the spaceship must be going at least 27,000 ft/sec. will it be going this fast when *t* = 30? Justify your answer.

*2. Walking Problem:* Pace Walker enters a walkathon. She starts off at 4 mi/hr, speeds up as she warms up, then slows down again as she gets tired. She estimates that her speed is given by: , where *t* is the number of hours since she started and *v(t)* is in miles per hour.

1. Pace walks for 3 hours. Draw the graph of *v(t*) as a function of t for these three hours. Sketch the result on you paper. Be sure your calculator is in radian mode.
2. Tell why a definite integral would be used to find the distance Pace has gone in 3 hours.
3. Estimate the integral in 2b, using six trapezoids. Show these trapezoids on your graph. About how far did Pace walk in the 3 hours?
4. How fast was Pace walking at the end of 3 hours? When did her maximum speed occur? What was her maximum speed?

3. *Aircraft Carrier Landing Problem:* In 1993, Kara Hultgreen became one of the first female pilots authorized to fly navy planes in combat. Assume she comes in for a landing on the carrier, her speed in feet per second takes on the values shown in the table. Find, approximately, how far her plane travels as it comes to a stop. Is her plane in danger of running off the other end of the 800-ft-long deck?

|  |  |
| --- | --- |
| Sec | Ft/sec |
| 0.0 | 300 |
| 0.6 | 230 |
| 1.2 | 150 |
| 1.8 | 90 |
| 2.4 | 40 |
| 3.0 | 0 |

|  |  |
| --- | --- |
| Time | Cubic ft/hr |
| 12:00 am | 5,000 |
| 3:00 am | 8,000 |
| 6:00 am | 12,000 |
| 9:00 am | 13,000 |
| 12:00 pm | 11,000 |
| 3:00 pm | 7,000 |
| 6:00 pm | 4,000 |
| 9:00 pm | 6,000 |
| 12:00 am | 9,000 |

4. *Water over the Dam Problem:* The amount of water that has flowed over the spillway on a dam can be estimated from the flow rate and the length of time the water has been flowing. Suppose that the flow rate has been recorded every 3 hr for a 24-hour period, as shown in the table. Estimate the number of cubic feet of water that has flowed over the dam in this period.

|  |  |
| --- | --- |
| *D* inches | *A* in2 |
| 0 | 0.0 |
| 1 | 7.0 |
| 2 | 10.5 |
| 3 | 23.0 |
| 4 | 27.2 |
| 5 | 30.3 |
| 6 | 31.8 |
| 7 | 30.3 |
| 8 | 27.2 |
| 9 | 23.0 |
| 10 | 10.5 |
| 11 | 7.0 |
| 12 | 0.0 |

5. *Football Problem:* The table shows the cross-sectional area, *A*, if a football at various distances, *d*, from one end. The distances are in inches and the areas are in square inches. Use the trapezoidal rule to find, approximately, the integral of area with respect to distance. What are the units of this integral? What, then, o you suppose the integral represents?